



Revision of the *Trichoclinocera systemognatha* species subgroup from eastern Asia (Diptera, Empididae, Clinocerinae)

Toyohi Saigusa¹, Bradley J. Sinclair²

¹ 7-1-402 Baikoen 2-chome, Chuo-ku, Fukuoka-shi 810-0035, Japan

² Canadian National Collection of Insects & Canadian Food Inspection Agency, OPL-Entomology, K.W. Neatby Bldg., C.E.F., 960 Carling Ave., Ottawa, ON, K1A 0C6, Canada

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Corresponding author: Bradley J. Sinclair (bradley.sinclair@inspection.gc.ca)

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Abstract

The *Trichoclinocera systemognatha* species subgroup from eastern Asia is newly recognized on the basis of the long triangular projection from the ventral margin of the labellum and includes three new species, which are described here: *T. elongata* **sp. nov.**, *T. subelongata* **sp. nov.** and *T. systemognatha* **sp. nov.** An identification key to species is provided and their distributions mapped.

Key Words

Aquatic dance flies, Bhutan, China, Nepal, new species, Vietnam

Introduction

Adults of the genus *Trichoclinocera* Collin, 1941 (Diptera: Empididae: Clinocerinae) are common on emergent rocks in large streams and rivers with open overhead canopy in North America and Asia, with larvae found among rocks and moss in riffle zones (Sinclair 1994; Saigusa and Sinclair 2016). Prior to this study, there were 44 described species found in the Nearctic, Palearctic and Oriental Regions (Yang et al. 2007; Li and Yang 2009; Sinclair and Shamshev 2014; Saigusa and Sinclair 2016, 2021; Sinclair et al. 2020).

This is fourth in a series of papers revising the eastern Asian species of *Trichoclinocera*. The first contribution revised the species of the *T. dasyscutellum* species group and included eight species (Sinclair and Saigusa 2005). The second study revised the Japanese fauna and included nine species (Saigusa and Sinclair 2016). The third study revised species of the *T. yixianensis* species group and included five species (Saigusa and Sinclair 2021). In this study, the species of the newly established *T. systemognatha* species subgroup are revised, which presently occurs in Bhutan, China, Nepal and Vietnam.

Materials and methods

This study is based on material deposited in the following institutions: Hokkaido University, Sapporo, Japan (HUS); Biosystematics Laboratory, Kyushu University, Fukuoka, Japan (KUMF); and Canadian National Collection of Insects, Ottawa, Canada (CNC). Label data for primary types are cited from the top downward, with the data from each label in quotation marks. Labels are cited in full, with original spelling, punctuation, and date, and label lines are delimited by a slash (/). The repository of each type is given in parentheses. Secondary type data are abridged and listed alphabetically.

Methods used in specimen preparation follow Sinclair (1994, 1995) and Saigusa and Sinclair (2016). The following abbreviations are used in the description: acr - acrostichal setulae; dc - dorsocentral setae; dm - discal medial cell; npl - notopleural setae; pal - postalar seta; pprn - postpronotal setae; presut - presutural supra-alar setae; psut - postsutural supra-alar setae; R - radial vein; sctl - scutellar setae; T - tergite. Terms used for adult structures follow those of Cumming and Wood (2017).

Photographs were taken with a Leica camera model DMC5400 using Leica Application Suite X. SimpleMappr (Shorthouse 2010) was used to plot the distribution of each species.

Taxonomy

Trichoclinocera systemognatha species subgroup

Recognition. This distinctive group of species of *Trichoclinocera* is characterized by long triangular projection from the ventral margin of the labellum (Figs 1, 5), gena broad, and tarsus much shorter than tibia on all legs. In addition, there is a transverse row or crown of stout supracervical setae on the posterior surface of the head (Fig. 1) and erect anterior setae on the mid femur (Fig. 5).

Remarks. The *T. systemognatha* species subgroup is an assembly of species related to *T. rostrata* (Vaillant, 1960) within the large *T. lapponica* species group. In *T. rostrata*, the labellum is prolonged posteriorly and pointed (Vaillant 1960, fig. 3j) and the stout supracervical setae form a dense cluster.

Trichoclinocera elongata sp. nov.

<https://zoobank.org/BF09598F-1479-4EF8-BC18-7CFFC220D61E>

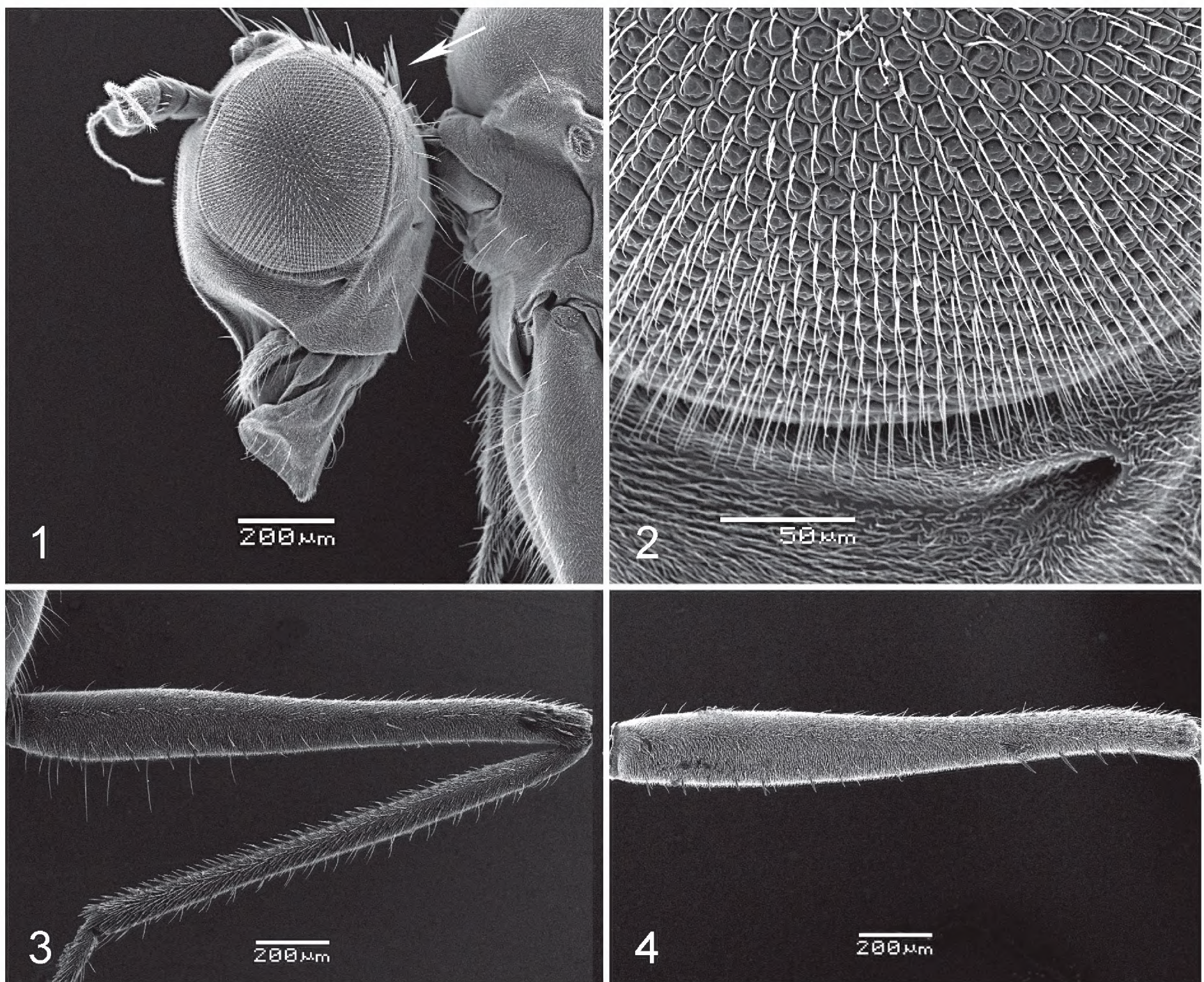
Figs 7, 10

Type material. *Holotype* • ♂, labelled: “YUNNAN: Yongping/ Meihuapu [25°29'N 99°36'E; 2198 m] (2300m)/ 83 km from Xiaguan/ 7. Jun. 1996/ T. SAIGUSA col.”; “HOLOTYPE/ *Trichoclinocera/ elongata/* Saigusa & Sinclair [red label]” (KUMF).

Etymology. This species name is derived from the Latin *elongatus* (prolonged), in reference to the very long, narrow hypandrium.

Diagnosis. This species is distinguished by one stout anterior subapical seta on the fore femur and males of this species are distinguished by their very long hypandrium (1.1 mm) (Figs 7, 10) and lacking stout posteroventral setae on the apical fourth of the fore femur.

Description. Wing length (n = 1): 4.6 mm. **Male.** Bright blue pruinescence laterally, with dark brown vertex of head, scutum and dorsum of abdomen. Head rounded; compound eyes large, rounded. Face convex, narrowest at middle, ca. 1.5 × width of antennal sockets, entirely



Figures 1–4. Scanning Electron photographs of *Trichoclinocera systemognatha* sp. nov. **1.** Female head, lateral view [arrow pointing to transverse row of stout setae]; **2.** Ommatrichia of lower female eye, lateral view; **3.** Male fore femur, anterior view; **4.** Female fore femur, anterior view.

clothed in bright whitish blue pruinescence; lower margin of face with slight cleft with small carina or swelling; gena one-fourth as wide as height of eye. Vertex and ocellar triangle dark brown, lower postociput and gena lightly pruinescent. Ocellar setae longest among cranial setae; occiput with 1 pair of setae posterior to ocellar triangle; above ‘neck’ row or crown of supracervical setae, setae in middle longest, decreasing in length laterally; postocular with row of short setae along margin of eye, upper 6 setae dark, stouter than lower setae. Arista stout, shorter than width of eye; slightly tapered apically. Palpus cylindrical, length less than one-third height of eye; labellum with ventral triangular projection.

Pleura and lateral margin of scutum, including postpronotal lobe, extending toward 1st dc and notopleuron with bright blue pruinescence (viewed laterally); scutellum, postalar ridge and region medial to postalar light brown. Thoracic setae shorter than width of eye; several acr anterior to 1st dc; 5 pairs dc; 1 slender short pprn, one-half length of dc; 1 slender presut spal; 2 npl; 1 psut spal; 1 pal; 1 pair sctl and several pale marginal setulae; several pale setulae on postpronotal lobe and notopleural depression. Laterotergite with patch of pale setae; prothoracic episternum, posteromedial margin of katepisternum and hind margin of metepisternum with long pale setulae.

Wing narrow, infusate; narrow, faint, elliptical pterostigma present. One basal costal seta, two-thirds length of posterior dc. Row of setulae from base of R to just beyond origin of Rs, basal setulae longer than apical setulae, subequal to basal costal seta; cell dm produced apically; R₄₊₅ curved; R₄ and R₅ divergent throughout. Halter knob dark with base of shaft orange-brown.

Legs dark brown, except coxae with blue pruinescence concolourous with pleura. Coxae with long pale marginal setae; anterior face of fore coxae densely clothed in long, pale setae, outer basal not longer than other setae. Fore femur with 1 stout, black anterior subapical seta, shorter than width of femur; anteroventral margin with row of 4 stout, black setae on apical third and row of 6 setae on basal half, separated by wide median gap, basal setae ca. one-sixth width of femur; basal half with posteroventral row of ca. 8 long golden setae, longer than width of femur, apical half with several shorter pale setae, less than width of femur, lacking stout, black setae. Fore tibia with biserial row of short setae beneath, ca. one-third to one-half width of tibia. Foreleg tarsomeres lacking white ventral pubescence. Mid femur with long, erect anterior setae, slightly longer than width of femur. Mid and hind femora with 2–4 pairs of slender antero- and posteroventral preapical setae; antero- and posterodorsal bristles absent. Hind tibia generally lacking setae except for several erect, stout dorsal and ventral setae on apical fourth. Tarsi much shorter than corresponding tibiae. Empodium pulvilliform, slightly shorter than claw, more than one-half length of tarsomere.

Hypandrium long and narrow, 1.1 mm, more than 3 × longer than epandrium (Figs 7, 10); anterior margin

rounded. Phallus not extending beyond clasping cercus; gently curved, apex with small membranous sac; ejaculatory apodeme small relative to hypandrium, arched anteriorly. Surstylus small, much shorter than clasping cercus with pair of 4 teeth-like projections on anterior margin. Clasping cercus finger-like, gradually tapered to rounded apex; anteroventral margin with several setae, longer than width of cercus; inner face with short peg-like setae; posterodorsal margin with fine setulae.

Female. Unknown.

Distribution. This species is known only from Yunnan Province of China (Fig. 14).

Trichoclinocera subelongata sp. nov.

<https://zoobank.org/F772A22D-CBC5-4A21-9FF1-16F68B8EFD68>

Figs 8, 11

Type material. *Holotype* • ♂, labelled: “(E. NEPAL)/ Thudam (3500–3800m)/ 27° 45' N, 87° 31' E —/ 27° 46' N, 87° 33' E”; “June 17, 1972/ J. Emoto leg./ Kyushu Univ. Col.”; “HOLOTYPE/ Trichoclinocera/ subelongata/ Saigusa & Sinclair [red label]” (KUMF). *Paratype*: **NEPAL**: • same data as holotype (1♀, KUMF).

Additional material. The following specimens are probably conspecific, but an associated male specimen (i.e. same locality) is required for verification: Nepal: • Chiliwa (1350 m), 27°29'N, 87°47'E – Shibku (2100 m), 27°30'N, 87°41'E, 7.vi.1972, J. Emoto; (1♀, KUMF); • same data except, H. Shima (1♀, KUMF).

Etymology. This species is named after its similarity to *T. elongata* sp. nov.

Diagnosis. This species is distinguished by two stout anterior subapical setae on the fore femur and males of this species are distinguished by their very long hypandrium (0.75 mm) (Figs 8, 11) and presence of stout posteroventral setae on apical fourth of fore femur.

Description. Wing length (n = 4): 3.9–4.6 mm. **Male.** Pale blue pruinescence laterally, with dark brown vertex of head, scutum and dorsum of abdomen. Head rounded; compound eyes large, rounded. Face convex, narrowest at middle, ca. 1.5 × width of antennal sockets, entirely clothed in bright whitish blue pruinescence; lower margin of face with slight cleft with small carina or swelling; gena one-fourth as wide as height of eye. Vertex and ocellar triangle dark brown, lower postociput and gena lightly pruinescent. Ocellar setae longest among cranial setae; occiput with 1 pair of setae posterior to ocellar triangle; above ‘neck’ row or crown of supracervical setae, setae in middle longest, decreasing in length laterally; postocular with row of short setae along margin of eye, upper 6 setae dark, stouter than lower setae. Arista stout, shorter than width of eye; slightly tapered apically. Palpus cylindrical, length less than one-third height of eye; labellum with ventral triangular projection.

Pleura and lateral margin of scutum, including postpronotal lobe, extending toward 1st dc and notopleuron with pale blue pruinescence (viewed laterally); scutellum,

postalar ridge and region medial to postalar light brown. Thoracic setae shorter than width of eye; several acr anterior to 1st dc; 5 pairs dc; 1 slender short pprn, one-half length of dc; 1 slender presut spal; 2 npl; 2 psut spal; 1 pal; 1 pair sctl and several pale marginal setulae; several pale setulae on postpronotal lobe and notopleural depression. Laterotergite with patch of pale setae; prothoracic episternum, posteromedial margin of katepisternum and hind margin of metepisternum with long pale setulae.

Wing narrow, infusate; narrow, faint, elliptical pterostigma present. One basal costal seta, two-thirds length of posterior dc. Row of setulae from base of R to just beyond origin of Rs, basal setulae not longer than apical setulae; cell dm produced apically; R₄₊₅ straight; R₄ and R₅ divergent throughout. Halter knob dark with base of shaft orange-brown.

Legs dark brown, except coxae with blue pruinescence concolourous with pleura. Coxae with long pale marginal setae; anterior face of fore coxae with pale setae, outer basal not longer than other setae. Fore femur with 2 stout, black anterior subapical setae, shorter than width of femur; anteroventral margin with row of 4 stout, black setae on apical third and row of 6 setae on basal half, separated by wide median gap; ca. one-fourth width of femur; posteroventral margin with row of setae, 3 setae on apical fourth similar to anteroventral setae, remaining setae slender, increasing in length basally to ca. two-thirds width of femur. Fore tibia with biserial row of short setae beneath, ca. one-third to one-half width of tibia. Foreleg tarsomeres lacking white ventral pubescence. Mid femur with long, erect anterior setae, slightly longer than width of femur. Mid and hind femora with 2–4 pairs of slender antero- and posteroventral preapical setae; antero- and posterodorsal bristles absent. Hind tibia generally lacking bristles except for several erect, stout dorsal and ventral setae on apical fourth. Tarsi much shorter than corresponding tibiae. Empodium pulvilliform, slightly shorter than claw, more than one-half length of tarsomere.

Hypandrium long and narrow, 0.75 mm, more than 2 × longer than epandrium (Figs 8, 11); anterior margin with small apodeme. Phallus not extending beyond claspings cercus; sinuous, apex with small membranous sac; ejaculatory apodeme small relative to hypandrium, slightly arched anteriorly. Surstylus small, much shorter than claspings cercus with pair of 4 teeth-like projections on anterior margin. Claspings cercus finger-like, gradually tapered to rounded apex; anteroventral margin with several setae, longer than width of cercus; inner face with short peg-like setae; posterodorsal margin with fine setulae.

Female. Similar to male except as follows: chaetotaxy of fore femur very similar, except posteroventral setae reduced; fore tibia lacking modified setae beneath. Terminalia: undissected.

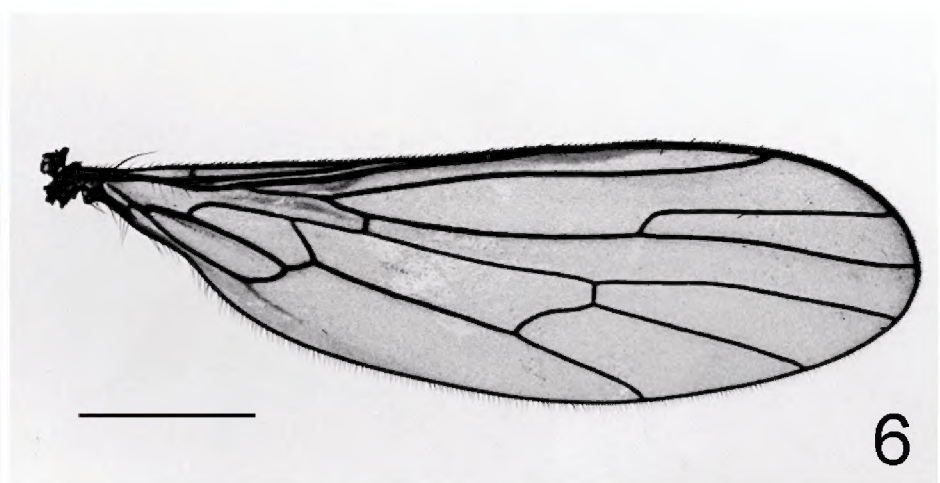
Distribution. This species is known only from eastern Nepal (Fig. 14).

***Trichoclinocera systemognatha* sp. nov.**

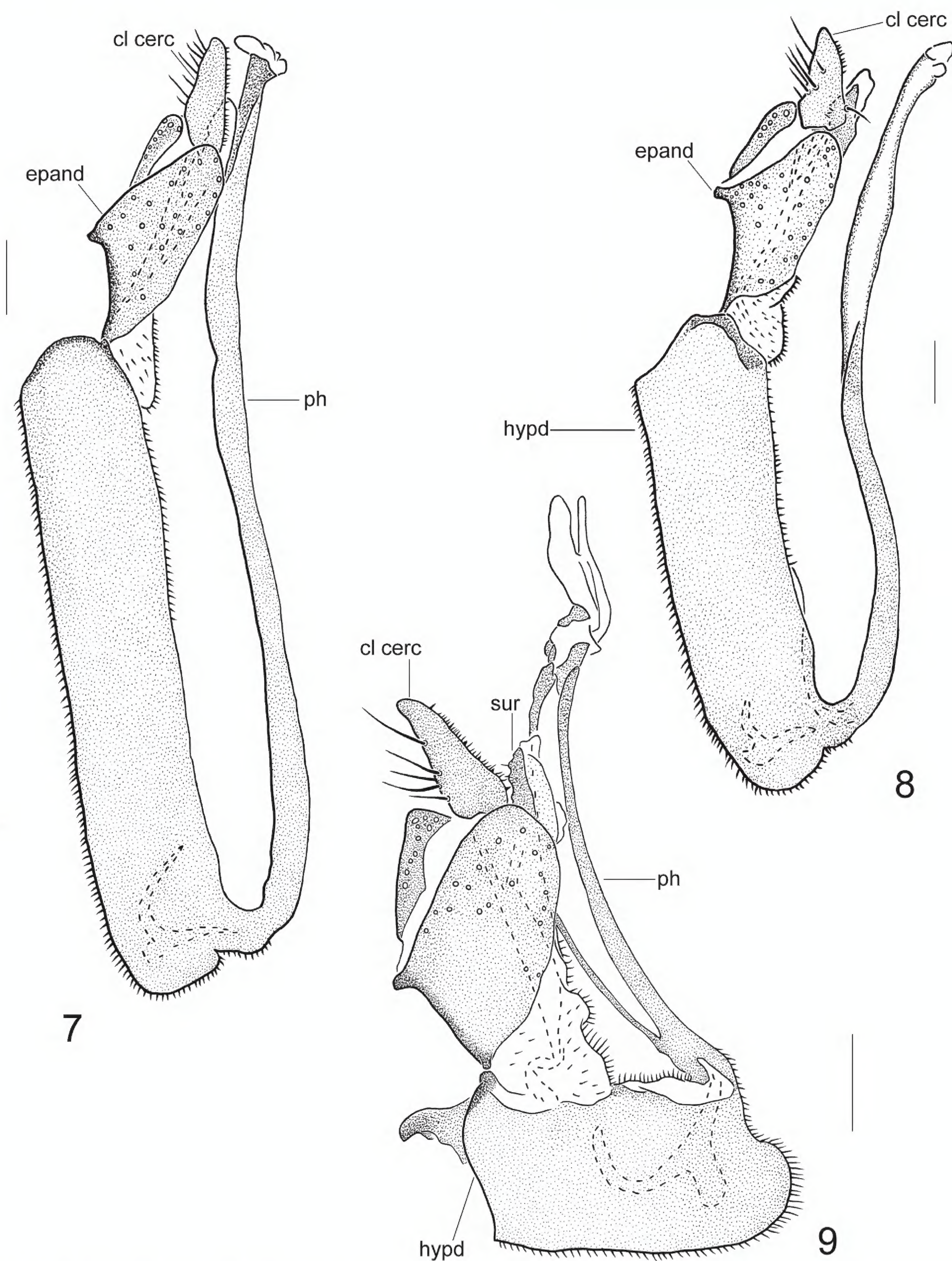
<https://zoobank.org/346C1373-4BF6-4F18-BDA9-ECF2792073C3>

Figs 1–6, 9, 12–14

Type material. *Holotype* • ♂, labelled: “(BHUTAN)/ E of Dochhu/ La [27°29'N 89°45'E], 2800m/ 16. viii.1993/ T. Saigusa”; “HOLOTYPE/ Trichoclinocera/ systemognatha/ Saigusa & Sinclair [red label]” (KUMF). *Paratypes*: **BHUTAN**: • Same data as holotype (2 ♂, 4 ♀, KUMF); • same data except, 20.viii.1993 (2 ♂, 1 ♀, KUMF); • E of Jilay La [27°22'N, 89°22'E], 3000 m, 19.viii.1993, T. Saigusa (1 ♂, CNC; 5 ♂, 9 ♀, KUMF); • W of Yutong La [27°31'N, 90°34'E], 3250 m, 15.viii.1993, T. Saigusa (4 ♂, 2 ♀, CNC; 23 ♂, 35 ♀, KUMF). **CHINA: Yunnan**: • Lijian, Heishuihe [27°09'N, 100°14'E], 2800–2900 m, Yulongxueshan, 15.vi.1996, T. Saigusa (1 ♂, CNC; 7 ♂, 14 ♀, KUMF); • Dali, Daboping [25°34'N, 100°08'E], 1900–2200 m, 7 km W Xianguan,



Figures 5, 6. *Trichoclinocera systemognatha* sp. nov. **5.** Male habitus; **6.** Wing. Scale bars: 0.75 mm (**5**); 1.0 mm (**6**).



Figures 7–9. Male terminalia of *Trichoclinocera systemognatha* species subgroup, lateral view. **7.** *T. elongata* sp. nov.; **8.** *T. subelongata* sp. nov.; **9.** *T. systemognatha* sp. nov. Scale bars: 0.1 mm. Abbreviations: cl cerc – clasp ing cercus; epand – epandrium; hypd – hypandrium; ph – phallus; sur – surstylus.

16.viii.1996, T. Saigusa (1 ♀, KUMF); • Yunglong, 3 km NNW of Zhichang [25°50'N, 99°02'E], 2500–2600 m, 5.vi.1996, T. Saigusa (1 ♂, CNC; 1 ♂, 3 ♀, KUMF). **NE-**

PAL: • Bagmati, Ghora Tobela [28°12'N, 85°27'E], Langtang, 3000–3400 m, 12.ix.1983, M. Suwa (1 ♀, HUS); • Chiaksila [27°26'N, 86°57'E], 2800 m, 20.vii.1981,



Figures 10, 11. Male terminalia of *Trichoclinocera systemognatha* species subgroup, lateral view. **10.** *T. elongata* sp. nov.; **11.** *T. subelongata* sp. nov. Scale bars: 0.1 mm.

J. Emoto (14 ♂, 28 ♀, KUMF); • same data except, 14.vii.1981 (5 ♂, 1 ♀, CNC); • Dobang Kharka, 2400 m, 28°36'N, 83°24'E, 24.ix., 9–15.x.1971, A. Nakanishi (3 ♂, KUMF); • Thurukpa, 2600 m, 27°36'N, 87°36'E – Topke Gola, 3700 m, 27°38'N, 87°35'E, 12.vi.1972, J. Emoto (1 ♂, CNC; 1 ♂, KUMF); • NE of Thudam, 4000 m, 27°47'N, 87°36'E, 25.vi.1972, H. Shima (6 ♂, 9 ♀, KUMF); • Topke Gola, 3700 m, 27°38'N, 87°35'E, 13.vi.1972, H. Shima (1 ♂, KUMF); • Salpa La [27°27'N, 86°55'E], 2800–3000 m, 23.vii.1981, J. Emoto (1 ♂, 2 ♀, KUMF); • same data except, 28.vii.1981 (1 ♀, KUMF); • same data except, 29.vii.1981 (1 ♂, 1 ♀, KUMF). **VIET-NAM:** • Sa Pa, 1500 m [22.361°N 103.778°E], Lao Cai Prov., 27.v.1997, R. Matsumoto (1 ♂, KUMF); • same data except, 1700 m, 26.v.1997 (1 ♀, KUMF).

Etymology. The species name is derived from the Greek *systemos* (tapering to a point) and Greek *gnathos* (jaw), in reference to the pointed labellum of this species, which also characterizes this group of species.

Diagnosis. This species is distinguished from the other two species of this species subgroup by one (rarely two) stout anterior subapical seta(e) on the fore femur (Figs 3, 4) and males with a much shortened and stouter hypandrium (Figs 9, 12) and lacking stout posteroventral setae on the apical fourth of the fore femur (Fig. 3).

Description. Wing length (n = 5): 4.7–5.3 mm. **Male.** Bright blue pruinescence laterally, with dark brown vertex of head and scutum (Fig. 5). Head rounded; compound eyes large, rounded (Figs 1, 2). Face convex, narrowest at middle, ca. 1.3 × width of antennal sockets, entirely clothed in bright whitish blue pruinescence; lower margin of face with slight cleft with small carina or swelling; gena one-fourth as wide as height of eye. Vertex and ocellar triangle dark brown, lower postocciput and gena lightly pruinescent. Ocellar setae longest among cranial setae; occiput with pair of setae posterior to ocellar triangle; above 'neck' row or crown of supracervical setae, setae in middle longest, decreasing in length laterally; postocular with row of short setae along



Figures 12, 13. *Trichoclinocera systemognatha* sp. nov. **12.** Male terminalia; **13.** Female terminalia. Scale bar: 0.1 mm.

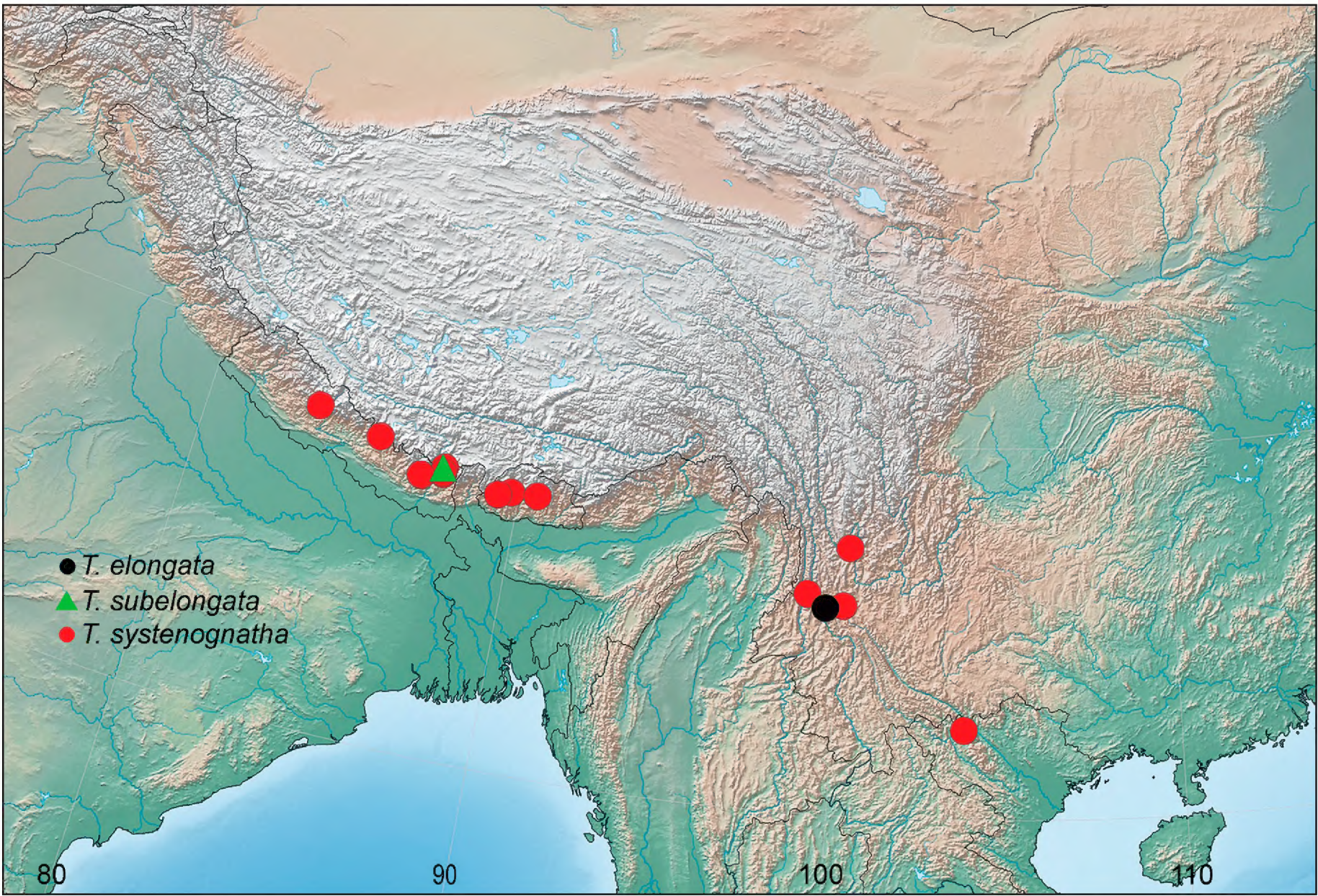


Figure 14. Known distribution of the *Trichoclinocera systemognatha* species subgroup.

margin of eye, upper 4–6 setae dark, stouter than lower setae. Arista stout, shorter than width of eye; slightly tapered apically. Palpus cylindrical, length less than one-third height of eye; labellum with ventral triangular projection.

Pleura and lateral margin of scutum, including postpronotal lobe, extending medially toward first dc and notopleuron with bright blue pruinescence; scutellum, postalar ridge and region medial to postalar light brown.

Thoracic setae shorter than width of eye; several acr anterior to first dc; 5 pairs dc; 1 slender, short pprn, one-half length of dc; 1 slender presut spal; 2 npl; 2 psut spal; 1 pal; 1 pair sctl and several pale marginal setulae; several pale setulae on postpronotal lobe and notopleural depression. Laterotergite with patch of pale setae; proepisternum, posteromedial margin of katapisternum and hind margin of metepisternum with long pale setulae.

Wing (Fig. 6) narrow, infusate; narrow, faint, elliptical pterostigma present. One basal costal seta, two-thirds length of posterior dc. Row of setulae from base of R to just beyond origin of Rs; cell dm produced apically; R_{4+5} slightly curved; R_4 and R_5 divergent throughout. Halter knob dark with base of shaft orange-brown.

Legs dark greyish brown, except coxae with blue pruinescence concolourous with pleura. Coxae with long pale marginal setae; anterior face of fore coxae with scattered pale setae, outer basal not longer than other setae. Fore femur with 1 (rarely 2) stout, black anterior subapical seta(e), shorter than width of femur; anteroventral margin with row of very short, stout, black setae, increasing in length apically, ca. one-sixth width of femur (Fig. 3); basal half with posteroventral row of slender, pale setae, slightly shorter than width of femur, without stout posteroventral setae on the apical fourth. Fore tibia with biserial row of short, erect setae beneath, ca. one-half width of tibia. Foreleg tarsomeres lacking white ventral pubescence. Mid and hind femora with row of long, erect anterior setae, slightly longer than width of femur. Mid and hind femora with 2–4 pairs of slender anteroventral and posteroventral preapical setae; anterodorsal and posterodorsal setae absent. Hind tibia generally lacking setae except for several erect, stout dorsal and ventral setae on apical fourth. Tarsi much shorter than corresponding tibiae; tarsomere 1 of all legs with long ventral seta at base. Empodium pulvilliform, slightly shorter than claw, more than one-half length of tarsomere.

Hyandrium broad, quadrate, distinctly longer than epandrium (less than 1.3 times); anterior margin with or without long slender apodeme (Fig. 9). Phallus extending beyond clasping cercus; gradually arched throughout; apical portion flattened in dry specimens; apex with flexible anterior sclerite, occasionally with long narrow membranous sac and longitudinal groove laterally (maybe expansion of inner sac due to clearing); ejaculatory apodeme large, arched strongly anteriorly. Surstylus small, much shorter than clasping cercus with pair of knob-like projections on anterior margin bearing setulae. Clasping cercus finger-like, gradually tapered to rounded apex; anteroventral margin with several setae, longer than width of cercus; inner face with short, peg-like setae especially on basal half.

Female. Similar to male except as follows: face blue pruinose, brownish medially; chaetotaxy of fore femur reduced, with setae of anteroventral row shorter and less stout (Fig. 4); posteroventral setae slenderer, one-fifth width of femur; fore tibia lacking modified setae beneath. Terminalia (Fig. 13): sclerites closely approximated laterally; T8 with posterior row of long setae, dorsal setae longer than length of sclerite in dorsal view; T9+10 with curved setae on apical two-thirds, with 5 apical and several inner setae more stout than remaining setae; anteroventral corner of T9+10 subtriangular, prolonged obliquely.

Distribution. This species is known from eastern Bhutan, Nepal, Yunnan Province (China) and Vietnam (Fig. 14).

Remarks. Some variation in the inner chaetotaxy of the clasping cercus was noted among various populations. Specimens from Nepal (Thudam) possessed very long spine-like setae, especially dense towards the apex, while in Yunnan there were mostly blunt spines, denser basally. In Nepal (Chiaksila) specimens, the spine-like setae were longer than among Yunnan specimens, but also concentrated basally.

Key to males of the *Trichoclinocera systemognatha* species subgroup

- 1 Hyandrium greatly elongated, at least twice length of epandrium (Figs 7, 8, 10, 11) 2
- Hyandrium broad and short, only slightly longer (less than 1.3 times) than length of epandrium (Figs 9, 12) *T. systemognatha* sp. nov.
- 2 Hyandrium more than three times longer than epandrium (Figs 7, 10); fore femur with one stout anterior subapical seta and without stout posteroventral setae on apical fourth *T. elongata* sp. nov.
- Hyandrium slightly more than two times longer than epandrium (Figs 8, 11); fore femur with two stout anterior subapical setae and three stout posteroventral setae on apical fourth *T. subelongata* sp. nov.

Discussion

There are now 47 described species of *Trichoclinocera* worldwide, with 15 Nearctic species, one Holarctic species, and 31 species from the eastern Palearctic and Oriental Regions (Saigusa and Sinclair 2021). Species of the *Trichoclinocera systemognatha* species subgroup extend from Nepal to Vietnam (Fig. 14). This distinct assembly of species is assigned to the *T. lapponica* species group (Sinclair

1994; Saigusa and Sinclair 2021), which is characterized by a convex projecting face and narrow phallus and is possibly related to *T. rostrata* within that species group.

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